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Modelling the trailing edge noise using optimisation techniques within a rapid distortion theory framework SARAH STIRRAT, MOHAMMED AFSAR, EDMONDO MINISCI, IOANNIS KOKKINAKIS, University of Strathclyde — The sound radiated by a jet flow interacting with a flat plate has received much recent attention in Aero-acoustics research owing to its canonical representation of jet installation effects. Rapid-distortion theory (RDT) uses linear theory to determine both this sound and the hydrodynamic field that generates it. When the plate is positioned parallel to the level curves of the streamwise mean flow , the theory shows that the unsteady flow is related to an upstream convected quantity (the input) that is an arbitrary function of its arguments. This quantity is then related to a measureable turbulence correlation function (R_{22}) to determine the far field radiated sound (the response).
We extend this model by including anti-correlation effects in the function form of R_{22} . There are several parameters within the model which need to be selected in order to find the optimum acoustic spectrum across acoustic Mach number and far-field angle. Here, we discuss various global optimisation techniques used to obtain the parameters in acoustic spectrum formula. This was achieved by either optimising R_{22} or optimising the acoustic model. We discuss these approaches and show how they yield very accurate sound predictions across the Mach number and observation angle regime.

Sarah Stirrat
University of Strathclyde

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